TWO-PLANE WAVE TOMOGRAPHY AND LITHOSPHERIC STRUCTURE BENEATH EASTERN TIBET

Savas Ceylan

Dr. Eric Sandvol, Dissertation Supervisor

ABSTRACT

In the first part of this research, I investigate the lithospheric structure beneath E. Tibet, using Rayleigh waves and two-plane wave tomography (TPWT). My results indicate that subhorizontal underthrusting of the Indian plate beneath the region does not extend much further north of Bangong-Nijuang Suture. Moreover, I suggest that the Indian lithosphere is laterally torn into at least two fragments. The westernmost fragment is detached from the rest of the Indian plate, and vertically sinking into the asthenosphere. Further, I observe low velocity zones along the northern and southern branches of the Kunlun fault, and I attribute these zones to strain heating due to ductile deformation. Moreover, these low velocity zones below the Kunlun Shan are continuous at depth, providing evidence against a present southward continental subduction south of Qaidam Basin.

In the second part, I calculate synthetic seismograms for ideally isotropic checkerboard earth models for determining the resolution capabilities of TPWT. My results indicate that SV anomalies smaller than the dominant wavelength of surface waves can be recovered down to ~200 km. For Love waves, a modified version of the approach is required, incorporating two perpendicular components of plane wave solutions along x and y directions. Moreover, the method exhibits adequate resolution for SH waves down to ~100 km. Smearing is more evident in SH results due to shallower depth sensitivity and longer wavelengths of Love waves than Rayleigh waves.